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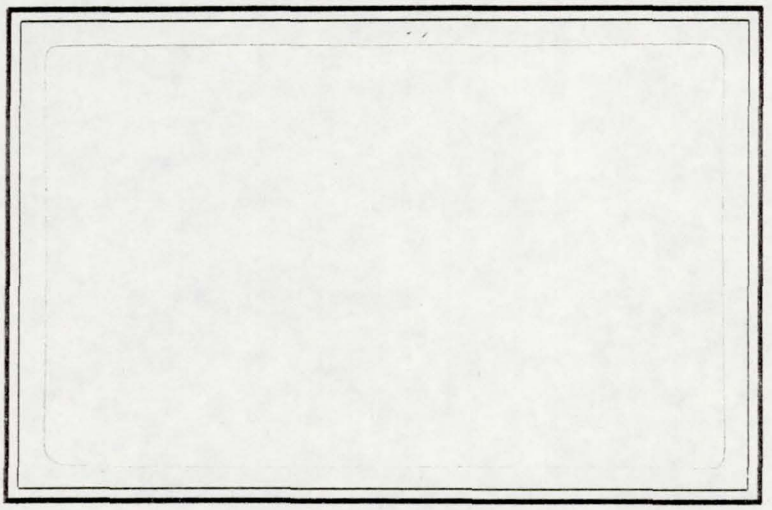

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PDSS/IMC

QUALIFICATION TEST

USER'S MANUAL

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PREFACE

This document contains user information for the operation of the Payload Development Support System (PDSS)/Image Motion Compensator (IMC) Qualification Test (QT) Software.

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A/D	Analog/Digital
AO	Analog Outputs
CAMAC	Computer Automated Measurement and Control
DEP	Dedicated Experiment Processor
DSD	Data Systems Design
FI	Flexible Inputs
GSE	Ground Support Equipment
IMC	Image Motion Compensation
IMCE	Image Motion Compensation Electronics
I/O	Input/Output
LSB	Least Signigicant Bit
MSB	Most Significant Bit
PDSS	Payload Development Support System
P/S	Pulses/Second
QT	Qualification Test
SEID	Spacelab Experiment Interface Device
VDU	Visual Display Unit

1.0 INTRODUCTION

The PDSS/IMC Qualification Test software is designed and operates in accordance with the "PDSS/IMC Requirements and Functional Specifications", IR-AL-010, 1 June 1983. The PDSS/IMC Qualification Test design specifications are contained in document IR-AL-021, "PDSS/IMC Qualification Test Software Detailed Design Specifications".

The PDSS/IMC Qualification Test (QT) software is designed for checkout of the IMCE on a board level. The QT tests have been defined to permit controlled testing of the IMCE interfaces. The standard PDSS functions are available for PDSS/IMC. A CAMAC crate and special purpose boards have been developed (or procured) to support the IMCE QT. Figure A-1 depicts the PDSS/IMC GSE layout while Figure A-2 shows the PDSS/IMC CAMAC Crate card locations. Figure A-3 shows the PDSS/IMC GSE Functional Diagram and also identifies the cabling required for the IMC application.

The IMC QT software has been developed as user tasks running under PDSS. Figure A-4 depicts the tasks, task interfaces, and data flow for QT software.

This manual defines the user interfaces used for QT set up, run time commands, run time displays, and shutdown. The reader should be familiar with RT-11 and PDSS.

2.0 PDSS/IMC QT STARTUP

The following start up procedures should be followed.

SET UP

1. Turn on IMCE CAMAC Crate
2. Turn on Conrac VDU
3. Turn on VT-100
4. Turn on DSD-880
5. Turn on PDSS CAMAC Crate
6. Turn on SEID
7. Turn on Quantex Line Printer

The LSI 11/23 will boot RT-11 from the DSD winchester disk. Standard RT-11 Operating System commands can be used to set the data and time.

- DATE dd-mmm-yy
- TIME hh:mm:ss

QT START

The following command is used to load and execute the IMC Qualification Test software.

@RQT

When loaded, the PDSS Master Display page (Figure A-15) will be shown on the VT-100. The PDSS software first establishes communication with the SEID. If the SEID initialization power up message is not present, the PDSS Master Display will request the operator to reset the SEID. This request is made on the PDSS Master Display page by displaying a

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"RESET SEID" message rather than the "SELECT OPTION" message and by ringing the VT-100 bell. When the operator depresses (only once) the SEID reset button, the PDSS Master Display page returns to the "SELECT OPTION" message.

PDSS has now been loaded and is operational.

EXECUTION

To initiate the IMC Qualification Test application, the following steps are to be entered on the PDSS Master Display page.

Step	Command	Action
1	4	Selects PDSS Execute
2	/GML-RES 3	Sets GML Analog Measurement Resolution to 120MV
3	MLOAD QT.MON	Causes ,QT SEID Monitor File to be loaded in LSI 11/23
4	XSEND	Sends SEID Monitor to SEID
5	MON	Starts SEID Monitor
6	TVS	Switches VDU to User Pages
7	INIT	Activates User Tasks "QT: WELCOME TO PDSS/IMC - STRIKE "=STAR" TO PROCEED" Message will be written to system console

8	=START	Causes PDSS/IMC to perform initialization "QT: QT INIT COMPLETE -- STRIKE "=STAR" TO PROCEED" Message will be written to system console
9	=START	Causes PDSS/IMC QT to begin operation
10	=RALG	Execute RALG test to gather IMCE AI's

TERMINATION

To terminate a PDSS/IMC QT session, the following steps should be performed.

STEP	COMMAND	ACTION
1	=STOP	Stops Log, closes files and prepares QT for termination
2	MOFF	Stops SEID GML
3	QUIT	Stops PDSS
4	CTRL-C CTRL-C	Terminates PDSS Task
5	CTRL-F CTRL-C CTRL-C UNL-F	Unloads Foreground Task

3.0 PDSS/IMC QT COMMANDS

PDSS/IMC QT commands are broken into two categories: QT Test commands and QT system commands. Tables 3-1 and 3-2 list the QT commands for each category.

The general syntax for PDSS/IMC QT commands is as follows.

=cccc</k> <p1,p2,...pn>

All PDSS/IMC QT commands must have an equal "=" character as the first character. The "=" character is used by the PDSS keyboard monitor for detecting those commands to be handled by user tasks. Failure to have an "=" as the first character results in a PDSS message, "PDSS-68: INVALID COMMAND".

The 'cccc' field is specified in Tables 3-1 and 3-2. Embedded blanks are not allowed in the 'cccc'.

The < > brackets denote optional data for commands.

Keys (/k) are optional and may be included with commands.

Parameters are entered as p1,p2,...,pn. Unless otherwise specified, the data is entered in hexadecimal. Leading zeroes are not required. Spaces are allowed between parameters but not within the data itself. Either commas or spaces may be used as separators. The number of parameters is a function of the command.

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TABLE 3-1: QT TEST COMMANDS

COMMAND	ACTION
=XIIT	Execute IMCE DEP Instruction Self-Test
=XIMT	Execute IMCE DEP Memory Test
=RDRI	Execute Read RAUI Data Test
=RDIS	Execute Read Discrete Input Test
=RALG	Execute Read Analog Input Test
=RGYR	Execute Read Gyro Input Test
=RDRS	Execute RAUS Data Test
=ISON	Execute Discrete Output ON Test
=ISOF	Execute Discrete Output OFF Test
=ISOT	Execute Discrete Output Test
=IDWP	Execute Read WUPPE Data Test
=IDUI	Execute Read UIT Data Test
=IDRS	Execute Issue RAUS Data Test
=PGMT	Execute Preset GMT
=RGMT	Execute Read GMT
=XPIT	Execute PCC Instruction Test
=XPMT	Execute PCC Memory Test
=XHRM	Execute HRM Set
=XTPT	Execute Throughput Test
=SSPR	Execute Set Pulse Synchronous Read
=XINT	Execute IMCE Initialize

TABLE 3-2: QT SYSTEM COMMANDS

COMMAND	ACTION
=CTRL	System Control
=VIEW	Display QT Data or SEID Data
=LOG	Activate/Deactivate Log
=STOP	Stop QT
=DISP	Display Page
=PMEM	Print Display Pages
=SRST	System Reset
=PIO	Issue CAMAC I/O
=STAR	System Start
=P	Single Step
=COMM	Insert Comment for Log
=MOD	Modify QT Data

3.1 QT TEST COMMANDS

The 21 QT test commands identified in Table 3-1 initiate a specific Qualification Test.

The logical sequence for all QT tests is as follows.

1. PDSS/IMC performs test set up.
2. PDSS/IMC sends messages to IMCE.
3. IMCE sends message acknowledge.
4. PDSS/IMC waits while IMCE performs test.
5. IMCE sends response message.
6. PDSS/IMC sends acknowledge.
7. IMCE sends second response message (if required).
8. PDSS/IMC sends acknowledge.
9. PDSS/IMC verifies test data.

The general syntax of the QT test commands is as follows.

=cccc</N> <p1,p2,...pn>

The number of parameters for each command is specified in Table 3-3 along with the QT data name. Each of the commands is described below. The /N key removes a task from the task sequence (see Section 3.2.1).

The user should reference the IR-AL-010 or IR-AL-021 documents for details of the individual QT tests. Tables 3-4 and 3-5 define the QT command and response messages and data content.

For each of the QT commands, the following information is provided: the command message (C:), the response message (R:), the command parameter data (P:), the varying data function, and any pertinent notes.

TABLE 3-3: QT TEST PARAMETERS AND DATA

COMMAND	# INPUT PARMS	DATA
XIIT	0	
XIMT	0	
RDRI	29	DRDRI
RDIS	32	DRDIS
RALG	32	DRALG
RGYR	24	DRGYR
RDRS	33	DRDRS
ISON	3	DISON
ISOF	2	DISOF
ISOT	28	DISOT
IDWP	3	DIDWP
IDUI	5	DIDUI
IDRS	28	DIDRS
PGMT	4	DGMT
RGMT	0	
XPIT	0	
XPMT	0	
XHRM	1	DXHRM
SPSR	1	DSPSR
XINT	0	
XTPT	0	

TABLE 3-4: QT COMMAND MESSAGES

COMMAND	COMMAND MESSAGE	#DATA WORDS
XIIT	F000 1303 0002 0001	0
XIMT	F000 1303 0002 0002	0
RDRI	F000 1303 001E 0003 dddd .... dddd	28
RDIS	F000 1303 0002 0004	0
RALG	F000 1303 0002 0005	0
RGYR	F000 1303 0002 0006	0
RDRS	F000 1303 0002 0007	0
ISON	F000 1303 0005 0008 xxxx xxxx yyyy	3
ISOF	F000 1303 0004 0009 xxxx xxxx	2
ISOT	F000 1303 001E 000A aaaa .... aabb	28
IDWP	F000 1303 0005 000B aaaa bbbb cccc	3
IDUI	F000 1303 0007 000C aaaa bbbb cccc dddd eeee	5
IDRS	F000 1303 001E 000D dddd .... dddd	28
PGMT	F000 1303 0005 000E aaaa bbbb bbbb	3
RGMT	F000 1303 0002 000F	0
XPIT	F000 1303 0002 0010	0
XPMT	F000 1303 0002 0011	0
XHRM	F000 1303 0003 0012 aaaa	1
SSPR	F000 1303 0003 0013 aaaa	1
XINT	F000 1303 0002 0014	0
XTPT	F000 1303 0003 0015 dddd	1

TABLE 3-5: QT RESPONSE MESSAGE

COMMAND	COMMAND MESSAGE	#DATA WORDS
XIIT	1281 0007 ssss nnmm .... nnmm	5
XIMT	1281 0008 ssss 0003 0000 aaaa dddd eeee cccc	6
RDRI	1281 001F ssss xxxx xxxx	29
	1281 0005 ssss xxxx xxxx xxxx	3
RDIS	1281 0004 ssss aaaa aaaa	2
RALG	1281 001F ssss dddd .... dddd	32
	1281 0005 ssss dddd dddd dddd	
RGYR	1281 000E ssss aaaa aaaa bbbb bbbb cccc cccc	12
	dddd dddd eeee eeee ffff ffff	
RDRS	1281 001F ssss dddd .... dddd	32
	1281 0005 ssss dddd dddd dddd	
ISON	1281 0004 ssss aaaa aaaa	2
ISOF	1281 0004 ssss aaaa aaaa	2
ISOT	1281 001E ssss aabb .... aabb	28
IDWP	1281 0006 ssss eeee ffff gggg	4
IDUI	1281 0009 ssss ffff gggg hhhh iiii jjjj kkkk llll	7
IDRS	1281 001F ssss bbbb .... bbbb	32
	1281 0005 ssss bbbb bbbb bbbb	
PGMT	1281 0005 ssss aaaa bbbb bbbb	3
RGMT	1281 0005 ssss aaaa bbbb bbbb	3
XPIT	1281 0002 ssss	0
XPMT	1281 0002 ssss	0
XHRM	1281 0003 ssss aaaa	1
SSPR	1281 0003 ssss aaaa	1
XINT	1281 0002 ssss	0
XTPT	1281 0003 ssss dddd	1

3.1.1 XIIT - Execute IMCE Instruction Test

The IMCE is commanded to perform an Instrution Test.

```
C:   F000 1303 0002 0001
R:   1281 0007 ssss nnmm .... nnmm
               ssss = IMCE Status
                      ---0 = Test Successful
                      ---1 = Test Fail

               nnmm = nn - Test Number, mm - Failure Code
                      01mm = Integer Arithmetic
                      01mm = Logical Operator
                      03mm = Control Operation
                      04mm = Compare Operation
                      05mm = Floating Point Arithmetic
```

3.1.2 XIMT - Execute IMCE Memory Test

The IMCE is commanded to perform a Memory Test.

```
C:   F000 1303 0002 0002
R:   1281 0008 ssss 0003 0000 aaaa dddd eeee cccc
               ssss = IMCE Status
                      ---0 = Test Successful
                      ---1 = Test Fail

               aaaa = Address of Error
               dddd = Data Read
               eeee = Data Expected
               cccc = EPROM Checksum
```

3.1.3 RDRI - READ RAUI

The IMCE is commanded to read the RAUI interface.

```
C:   F000 1303 001E 0003 dddd .... dddd
R:   1281 001F ssss xxxx .... xxxx
     1281 0005 ssss xxxx xxxx xxxx
```

dddd = Data Pattern Written to RAUI

0020
FAF5 1111 2222 3333 4444 5555 6666 7777
8888 9999 AAAA BBBB CCCC DDDD EEEE FFFF
0000 0123 4567 89AB CDEF FEDC BA98 7654
3210 0011 2233 4455 3210 0011 2233 4455

ssss = IMCE Status

xxxx = Data Pattern Read by IMCE

F000 1303 001E 0003 0020 2233

Varying Data:

The one's complement of the data pattern dddd is output on alternating executions.

3.1.4 RDIS - Read Discrete Inputs

The IMCE is commanded to read the DIO Discrete Inputs.

```
C:   F000 1303 0002 0004
R:   1281 0004 ssss aaaa aaaa
```

```
            ssss = IMCE Status
            aaaa = IMCE DIO Discrete Inputs (32 to 17)
                                            (16 to  1)
```

P: The PDSS sets the SEID/RAU Discrete Outputs per the command data table (xxyy).

xx = Channel Number (0 to 31)
yy = 01/ON, 00/OFF

```
0000 0101 0200 0301 0400 0501 0600 0701
0800 0901 0A00 0B01 0C0D 0D01 0E00 0F01
1000 1101 1200 1301 1400 1501 1600 1701
1800 1901 1A00 1B01 AC00 AD01 1E00 1F01
```

Varying Data:

The ON/OFF state is changed on alternate executions.

3.1.5 RALG - Read Analog

The IMCE is commanded to read its A/D AI's.

```
C:  F000 1303 0002 0005
R:  1281 001F ssss dddd .... dddd
    1281 0005 ssss dddd dddd dddd
```

```
            ssss = IMCE Status
            dddd = 32 A/D Analog Input Channels
                   10 bit, 2's complement, left justified
                   range = -10.0v to +10.0v
```

P: The PDSS sets the CAMAC 32 AO's per the command data table. (12 bit, 2's complement, right justified, range = -10.0v to +10.0v).

0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000

Varying Data:

One volt is added to all 32 channels for each execution. (1 volt = "00CC = 204 COUNTS)

Note:

The conversion for the IMCE Analog Inputs is as follows.

$$\text{Voltage} = \frac{\text{RAW}}{64} \cdot \frac{20\text{V}}{1024}$$

The conversion for the PDSS CAMAC Analog Outputs is as follows.

$$\text{Voltage} = \frac{\text{RAW}}{4096} \cdot 20\text{V}$$

Analog Input channels 8, 9, and 10 read the three thermister switches. The switch settings are as follows.

Position	Volts	Counts	Raw
UP	3.06V	668	29C0
DOWN	1.12V	568	2380

Analog Input channels 11, 12, 13, 14, 15, and 16 are differential analogs. Their expected values are computed below.

Expected = 2.4205 * Analog Output (Channel 11)
Expected = -2.4205 * Analog Output (Channel 12, ... 16)

If an Analog Output value exceeds 4.13 volts or is less than -4.13 volts, the differentials are saturated.

3.1.6 RGYR - Read Gryos

The IMCE is commanded to read the gyro pulses.

C: F000 1303 0002 0006
R: 1281 000E ssss aaaa aaaa bbbb bbbb cccc cccc
dddd dddd eeee eeee ffff ffff

ssss = IMCE Status
aaaa = 32 Bit Gyro Counter
bbbb = 32 Bit Gyro Counter
cccc = 32 Bit Gyro Counter
dddd = 32 Bit Gyro Counter
eeee = 32 Bit Gyro Counter
ffff = 32 Bit Gyro Counter

P: The PDSS loads the PDSS Gyro pulses per the following command data.

R	C	Rate (P/S)	Count	Channel
0400	0800	10,240.	2,048.	XA
0400	1000	10,240.	4,096.	ZA
0400	1800	10,240.	6,144.	YB
0400	2000	10,240.	8,192.	YC
0400	2800	10,240.	10,240.	XB
0400	3000	10,240.	12,288.	ZC
0400	0800	10,240.	2,048.	XA
0400	1000	10,240.	4,096.	ZA
0400	1800	10,240.	6,144.	YB
0400	2000	10,240.	8,192.	YC
0400	2800	10,240.	10,240.	XB
0400	3000	10,240.	12,288.	ZC

Note: The gyro rate conversion is as follows.

$$\text{Rate} = V * \frac{40,960}{4,096} = V * 10. \text{ pulses/second}$$

Max Rate = "0C00 = 30,720 pulses/second

Min Rate = "0001 = 10 pulses/second

Varying Data:

The rate is stepped from 0001, 0002, 0004, 0008, 0010, ..., 0100, 0200, 0400 (i.e., 10 P/S to 10,240 P/S). The sign is switched from + to - or - to + on alternate executions. The count value is set to 16. * rate.

Rate		Count	
0001	10 P/S	0010	16
...		...	
0400	10,240 P/S	4000	16,384

Note:

To perform the GYRO test without PDSS issuing pulse commands, the user enters "=GYRO/".

3.1.7 RDRS - Read RAUS

The IMCE is commanded to read the RAUS (ASTI) interface.

```
C:   F000 1202 0002 0007
R:   1281 001F ssss dddd .... dddd
     1281 0005 ssss dddd dddd dddd

               ssss = IMCE Status
               dddd = RAUS data - 32 words
```

P: The PDSS loads the RAUS buffer per the command data.

```
     0020
     0001 FFFE 0003 FFFC 0005 FFFA 0007 FFF8
     0009 FFF6 000B FFF4 000D FFF2 000F FFF0
     1111 2222 3333 4444 5555 6666 7777 8888
     9999 AAAA BBBB CCCC DDDD EEEE FFFF 0000
```

Varying Data:

The one's compliment of the data pattern dddd is output on alternate executions.

3.1.8 ISON - Issue DEI/DIO Discrete Outputs ON

The IMCE is commanded to turn on selected DIO Discrete Outputs and to set the DEI discretes.

C: F000 1303 0005 0008 xxxx xxxx yyyy
R: 1281 0004 ssss aaaa aaaa

xxxx = DIO Discrete Outputs (32 to 17)
(16 to 1)

Default
FFFF FFFF 002A

yyyy = DEI Discrete Outputs (16 to 1)

ssss = IMCE Status

dddd = IMCE DIO Discrete Inputs (32 to 17)
(16 to 1)

Varying Data:

The DIO DO's pattern xxxx xxxx is incremented by 0000 0001 each execution.

The DEI DO's are set per the following sequence (2A, 29, 26, 25, 1A, 19, 16, 15) which is equivalent to logical (LLL, LLH, LHL, LHH, HLL, HLH, HHL, HHH) for the mode commands. (H = High, L = Low.)

3.1.9 ISOF - Issue DIO Discrete Outputs OFF

The IMCE is commanded to turn off selected DIO Discrete Outputs.

C: F000 1303 0004 0009 xxxx xxxx
R: 1281 0004 ssss aaaa aaaa

xxxx = DIO Discrete Outputs (32 to 17)
(16 to 1)

Default
FFFF FFF

ssss = IMCE Status

aaaa = IMCE DIO Discrete Inputs (32 to 17)
(16 to 1)

Varying Data:

The DIO DO's pattern xxxx xxxx is incremented by 0000 0001 each execution.

3.1.10 ISOT - Issue DIO Discrete Outputs

The IMCE is commanded to issue a sequence of DIO Discrete Output commands.

C: F000 1303 001E 000A aabb .... aabb
R: 1281 001E ssss aabb aabb .... aabb

aabb = Discrete Output command

aa = Channel Number (0. to 31.)

bb = 00(OFF), 01(ON)

aa = Time Delay (F0)

bb = Delay Time (* 100 milliseconds)

aa = End of Sequence (FF)

bb = FF

Default

0000 0101 0200 0301 0400 0501 0600 0701

0800 0901 0A00 0B01 0C00 0D01 0E00 0F01

1000 1101 1200 1301 1400 1501 1600 1701

1800 1901 1A00 1B01 1C00 1D01 1E00 1F01

ssss = IMCE Status

Varying Data:

The Discrete Output values are alternated between ON(01) and OFF(00) for each execution.

3.1.11 IDWP - Issue WUPPE Data

The IMCE is commanded to issue data to the WUPPE interface.

C: F000 1303 0005 000B aaaa bbbb cccc

D: 1281 0006 ssss dddd eeee ffff gggg

aaaa = Number of Writes to WUPPE Interface
bbbb = Initial Data Pattern to be Written to WUPPE Interface
cccc = Increment Data Pattern for Data Written to WUPPE Interface

Default
0032 0000 0101

ssss = IMCE Status

dddd = Number of Writes Performed
eeee = Initial Data Pattern Written
ffff = Increment Data Pattern Used
gggg = Last Data Pattern Written

Varying Data:

The number of writes (aaaa) is incremented by two for each execution. The value is limited to a range 16 to 255.

The initial data pattern (bbbb) is incremented by the value 0101 for each execution.

The increment data pattern (cccc) is incremented by the value 0101 for each test.

3.1.12 IDUI - ISSUE UIT DATA

The IMCE is commanded to issue data to the UIT interface.

```
C:   F000 1303 0007 000C aaaa bbbb cccc dddd eeee
D:   1281 0009 ssss ffff gggg hhhh iiii jjjj kkkk llll
```

aaaa = Number of writes to UIT Interface
bbbb = Initial Data Pattern for UIT Interface Word 1
cccc = Increment Data Pattern for UIT Interface Word 1
dddd = Initial Data Pattern for UIT Interface Word 2
eeee = Increment Data Pattern for UIT Interface Word 2

Default
0032 0000 0101 0000 0101

ssss = IMCE Status
ffff = Number of Writes Performed
gggg = Initial Word 1 Data Pattern Written
hhhh = Increment Word 1 Data Pattern Used
iiii = Last Word 1 Data Pattern Written
jjjj = Initial Word 2 Data Pattern Written
kkkk = Increment Word 2 Data Pattern Used
llll = Last Word 2 Data Pattern Written

Varying Data:

The number of writes (aaaa) is incremented by 2 for each execution. The value is limited to a range 16 to 255.

The initial data patterns (bbbb and dddd) are incremented by the value 0101 for each execution.

The increment data patterns (cccc and eeee) are incremented by the value 0101 for each execution.

3.1.13 IDRS - ISSUE ASTI DATA

The IMCE is commanded to issue data to its ASTI interface.

```
C:   F000 1303 001E 000D dddd .... dddd
R:   1281 001F ssss bbbb .... bbbb
     1281 0005 ssss bbbb bbbb bbbb
```

dddd = 28 words ASTI data patterns

```
Default
0020 0001 FFFE 0003 FFFC 0005
FFFA 0007 FFF8 0009 FFF6 000B
FFF4 000D FFF2 000F FFF0 1111
2222 3333 4444 5555 6666 7777
8888 9999 AAAA BBBB
```

ssss = IMCE Status

bbbb = 32 Words Data Loaded in ASTI

```
F000 1303 001E 000D dddd .... dddd
```

Varying Data:

On alternate tests, the one's complement of the previous ASTI data pattern (dddd) is sent to the DEP. The first word in the pattern (0020) remains fixed at 0020.

3.1.14 PGMT - PRESET GMT

The IMCE is commanded to set the TMI GMT clock.

C: F000 1303 0005 000E aaaa bbbb bbbb
R: 1281 0005 ssss aaaa bbbb bbbb

aaaa = GMT Day (1 to 365)
bbbb = Elapsed milliseconds in day (0 to 86,400,000)

Default
0001 0000 0000 (Day 1)

ssss = IMCE Status

Note:
The PGMT command format is =PGMT day, hour, min, sec.

Example: =PGMT 2,4,3,7
Sets GMT to day 2, hour 4, minute 3, and second 7

3.1.15 RGMT - READ GMT

The IMCE is commanded to read the TMI GMT clock.

C: F0000 1303 0002 000F
R: 1281 0005 ssss aaaa bbbb bbbb

ssss = IMCE Status

aaaa = Day
bbbb = Milliseconds in day

3.1.16 XPIT - EXECUTE PCC INSTRUCTION TEST

The IMCE is commanded to initiate the PCC Instruction Test.

C: F000 1303 0002 0010
R: 1281 0002 ssss

ssss = IMCE Status

3.1.17 XPMT - EXECUTE PCC MEMORY TEST

The IMCE is commanded to initiate the PCC Memory Test.

C: F000 1303 0002 0011
R: 1281 0002 ssss

ssss = IMCE Status

3.1.18 XHRM - EXECUTE HRM OUTPUT

The IMCE is commanded to set HRM output.

```
C:   F000 1303 0003 0012 aaaa
R:   1281 0003 ssss aaaa
```

ssss = IMCE Status
aaaa = HRM Output State
0000 = OFF (Default)
0001 = ON

3.1.19 SSPR - SET PULSE SYNCHRONOUS READ

The IMCE is commanded to activate or inhibit the pulse synchronous read.

```
C:   F000 1303 0003 0013 aaaa
R:   1281 0003 ssss aaaa
```

aaaa = Pulse Synchronous Read State
0000 = Inhibit (Default)
0001 = Activate

ssss = IMCE Status

3.1.20 XINT - EXECUTE IMCE INITIALIZE

The IMCE is commanded to execute its initialization.

C: F000 1303 0002 0014
R: 1281 0002 ssss

ssss = IMCE Status

3.2 QT System Commands

The QT System commands identified in Table 3-2 provide operator control of system functions. Table 3-6 identifies the QT System commands and their syntax. Each of the commands is described.

QT System commands are performed by the QT keyboard monitor upon receipt from the PDSS keyboard monitor.

TABLE 3-6: QT SYSTEM COMMANDS SYNTAX

=COMM commstr	Commstr = character string of length 16
=CTRL</k...>	k = [V;M;S;P;T;U;W] 1≤i≤5 t=time in milliseconds
=DISP</I; /F; /U> pid	1≤ pid ≤ 5
=LOG	
=MOD adr,hexd,...,hexd	adr = octal address hexd=hexadecimal data
=PMEM <pid<,pid,...>>	0≤pid≤6
=PIO <R,n,a,f> <W,n,a,f,wd> <I> <J>	n=CAMAC n a=CAMAC a f=CAMAC f wd=hexadecimal data
=SRST	
=STOP	
=VIEW</S> <adr>	adr = octal address
=P	

3.2.1 COMM Command

Syntax: **=COMM commstr**
commstr = character string of length 16

The COMM command allows the operator to enter a 16 character comment line in the log buffer. On each log cycle, the entire log buffer including the comment field is written to disk.

The COMM command can be used for reference points, reminders, or test headers.

3.2.2 CTRL Command

Syntax: **=CTRL</k...>**
= [V;M;S;P;T;U;W]

The CTRL command provides system level control to the operator.

/V

The "/V" key toggles the verify control switch between verify/no-verify. If the verify control switch is verify, the verify logic is activated by the QT tests. If no-verify, the verify logic is bypassed. The operator can determine the current state of the verify control switch on QT display 1.

/M

The "/M" key toggles the mode control switch between single and automatic. When the single mode is active, the QT tests are performed once. When the automatic mode is active, the QT tests are repeated continuously for each command.

To exit the automatic mode, the "=CTRL/M" command must be entered again. The operator can determine the current state of the mode on QT Display 1.

/S

The "/S" key enters and exits (toggles) the sequence definition mode. When the sequence definition mode is entered, the operator defines the tests to be performed by entering "=cccc" (Section 3.1) commands. If a test is requested, a ">" character is displayed on QT Display 1. A test can be removed by a "=cccc/N" command.

The QT tests are not performed until the "=CTRL/S" command is entered to exit the sequence definition mode.

The sequence of tests is performed once unless the repeat mode (/M) has been requested.

The following example shows how the sequence definition mode is entered: tests XIIT, RALG, and IDRS requested; test RGYR requested then removed; and the sequence initiated.

Example:

=CTRL/S	Enter sequence mode
=XIIT	Request test XIIT
=IDRS	Request test IDRS
=RGYR	Request test RGYR
=RGYR/N	Remove test RGYR
=RALG	Request test RALG
=CTRL/S	Exit sequence definition mode and start test sequence

The tests are executed in the order displayed on the QT display, not in the order requested.

If a sequence is in progress (the single pass has not completed or the repeat mode is active), tests can be entered or removed by entering "=cccc" or "=cccc/N" commands.

/P

The "/P" key causes the sequence of tests to be performed in a single step mode. The "=P" command is the single step activator.

/T

The syntax of the "/T" key is /T i,t.

The "/T" key causes time parameter i to be updated to time value t (milliseconds). PDSS/IMC QT software provides the user with six setable time variables as listed in Table 3-7.

TABLE 3-7: TIME VARIABLES

Variable	Default	Function
T1	0.5 secs	IMCE Watchdog Resolution
T2	2.0 secs	Spare
T3	1.0 secs	Display Task Update Rate
T4	1.0 secs	CAMAC I/O Rate
T5	1.0 secs	Gyro complete Wait Bias
T6	1.0 secs	LOG Time Rate

/U

The "/U" command is used to modify the tolerance table.

TABLE 3-8: TOLERANCE TABLE

Symbol	Default	Description
TIMTOL	250	Time Tolerance (milliseconds)
AOTOL	31	AO Tolerance (counts)
FITOL	184	FI ON/OFF (counts)
GYTOL	10	GYRO Tolerance (counts)
SWTOL	6	Thermal Switch Tolerance (counts)
ADTOL	8	FI Differential Tolerance (counts)

The following example sets tolerance table values.

```
=CTRL/U  251, 32, 185, 11, 7, 9
```

/W

The "/W" command toggles the stop-on-error software control flag. When the stop-on-error software control flag is on, the PDSS/IMC executive enters a wait state if an error is detected while a test is performed.

The user can resume normal test execution with the "=P" command. The capability to stop when an error is detected is valuable to the operator when trying to isolate errors.

When the stop-on-error software flag is set, the item "WHOA" is displayed on display page 1.

3.2.3 DISP Command

Syntax: =DISP</I> pid
</F>
</U>

The DISP command is used to request the active display of a QT display page, to re-initialize a QT display page, to freeze a QT display page or, to unfreeze a display page.

Unless frozen, all display pages are updated on a round robin basis at the display rate.

As discussed in section 4.0, there are five QT display pages supported.

pid	Display Page	Figure
1	PDSS/IMC Status	A-6, A-7
2	PDSS/IMC QT CAMAC	A-8, A-9
3	PDSS/IMC Commands	A-10
4	VIEW Page	A-11, A-12
5	PDSS/IMC QT Messages	A-13, A-14

The pid parameter designates the QT display page (i.e., $1 \leq pid \leq 5$). A value for pid outside this range is treated as an invalid parameter and the command is not processed.

Example:

=DISP pid

Requests an active display of the page 'pid'

The requested page ('pid') is mapped to the active page of the VDU.

Example:

=DISP/I pid

Re-initializes the background data from disk for the page 'pid'

The foreground or variable data for page 'pid' will be lost.

Example:

=DISP/F pid

Freezes display page 'pid'

The Display function will not update the page data until an unfreeze is invoked.

Example:

=DISP/U pid

Unfreezes display page 'pid'

The designated page will be updated by the display function.

3.2.4 LOG Command

Syntax: = LOG

The =LOG command toggles the PDSS/IMC log control switch between active/inactive. When active the PDSS/IMC log function logs the IMC Data Buffers to disk file (IMC.LOG) at the interval specified. When inactive, the PDSS log function is not performed.

The operator can determine the current setting of the log control switch on QT Display 1.

3.2.5 MOD Command

Syntax: **=MOD adr,hexd,...,hexd**
adr = octal address
hexd = hexadecimal data

The MOD command is used to change QT data (see section 6.0). The hexadecimal data is moved into the QT data buffer beginning at the address (adr) specified. If the address range is actively being displayed on the VIEW page, the display data will be updated.

After all data has been deposited in memory, the next deposit address is displayed on the system console.

3.2.6 PMEM Command

Syntax: **PMEM <pid<,pid,...>>**
pid = page id; $0 \leq pid \leq 6$

The PMEM command prints the QT display pages on the PDSS line printer. This command provides a hard copy mechanism for saving the display pages during testing. All display pages are printed if no specific pages are requested.

Below are the pages that are available:

pid	Page Printed
0	Active Display Page
1 - 5	Display Pages 1 - 5
6	SEID Display Page
blank	All Pages

3.2.7 PIO Command

Syntax: **=PIO <R,n,a,f>**
<W,n,a,f,wd>
<I>
<J>

The PIO command provides the operator with a means to perform manual CAMAC I/O. (Note: Manual SEID I/O operations are provided by standard PDSS commands). The PIO command allows the operator to perform a read "<R...>", a write "<W...>", a CAMAC Dataway initialize "<I>" or a CAMAC Dataway clear "<J>".

The CAMAC n,a,f codes are not verified by the command. The I/O operation is performed immediately.

The write data "wd" is in hexadecimal.

QT Display page 2 has a display line NAF where the n,a,f read data and write data are displayed. To view this line, the operator must request display page 2 (=DISP 2).

3.2.8 SRST Command

Syntax: =SRST

The SRST Command causes the QT executive task to re-initialize. The QT active data is reset to zero, the SEID is re-initialized, and the CAMAC subsystems are initialized.

The "QT: INIT COMPLETE" message will be displayed when the initialization has been completed.

3.2.9 STAR Command

Syntax: =STAR

The STAR command is required to initiate the IMC QT application software. The control logic for QT is as follows.

```
WRITE "IMC: PDSS/IMC" TO SYSTEM CONSOLE
WAIT FOR "=STAR" COMMAND
PERFORM INITIALIZATION
WAIT FOR "=STAR" COMMAND
BEGIN QT
```

The two waits for "=STAR" commands are provided to allow the operator to enter any desired manual commands or to verify cabling before starting the test.

3.2.10 STOP Command

Syntax: =STOP

The STOP command closes the Log file, stops the logging function, and clears the CAMAC CSR, INT and CCR registers. The STOP command should be used just prior to terminating a QT session.

3.2.11 VIEW Command

Syntax: =VIEW</S> <adr>
adr = octal address

The view command causes the PDSS/IMC QT Data or the SEID Data Buffers to be displayed to the VDU. Figure A-11 shows the format of the VIEW display page. Section 6.0 defines the QT Data Buffer assignments. The data is displayed as 4 hex characters (16 bits).

The /S control key causes the SEID Data Buffer to be displayed rather than the QT Data Buffers. Section 6.0 also defines the SEID Data Buffer.

The default display (=VIEW) is the QT DRDRI data table address.

The VIEW display page is displayed to the VDU when the =VIEW command is entered. The data on the display is refreshed at the normal display refresh rate.

3.2.12 P Command

Syntax: =P

The '=P' command is used as the single step activator when the single step mode is active.

4.0 PDSS/IMC QT DISPLAYS

PDSS/IMC QT supports five user display pages and the SEID master display page. The user display pages are defined in the following table.

TABLE 4-1: DISPLAY PAGES

ID	TITLE	CONTENTS	FIGURE
1	QT.001	PDSS/IMC STATUS	A-6, A-7
2	QT.002	PDSS/IMC QT CAMAC	A-8, A-9
3	QT.003	PDSS/IMC COMMANDS	A-10
4	QT.004	PDSS/IMC QT VIEW	A-11, A-12
5	QT.005	PDSS/IMC QT SERIAL	A-13, A-14

The SEID master display page is shown in Figure A-5. The PDSS "TVS" command switches between the user pages and the SEID page. The "=DISP" command switches the user pages.

The contents of the five display pages are defined in the following section.

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QT.001 (See Figure A-6 and A-7)

<1> QT State and MODE LINE

SEQD LOG REP VER DATA
TPT NLOG NVER
WHOA

The SEQD indicates that the program is in the sequence definition mode.

The TPT indicates that the program is in the Throughput Test mode.

The WHOA indicates that the program stop-on-error software flag is on.

The LOG/NLOG indicates whether the program is logging or not logging data.

The REP indicates that tests or sequences of tests are to be executed repeatedly.

The VER/NVER indicates whether the QT data is being verified or not.

The DATA indicates whether the automatic data modification of QT data is being performed.

<2> QT Control Data

XXXX .... XXXX (16 data items)

(1) CYCLE - Cycle Count
(2) NDERRS - Number errors encountered
(3) VERRD - Verification errors (Table 9-1)
(4) VERRI - Interface errors (Table 9-2)
(5) ZCSR - CAMAC CSR
(6) LOGBLK - Current Log block
(7) GYROF - Gyro Output (Table 9-4)
(8) GYROE - Gyro Output Expected
(9) GYROA - Gyro Output Actual
(10) SWAIT - Special Wait Between Steps
(11) DSPSR - SPSR Data
(12) DXHRM - HRM Data
(13) ZSC - Last IMCE Status
(14) DGMT - GMT Day
(15) - GMT Milliseconds in Day
(16) - GMT Milliseconds in Day

<3> Number of Times Test Executed

When a test has been requested (single or sequence), the ">" character is located to the left of the command. When the test is being performed, the command is displayed in reverse video.

<4> Number of runs the test failed

<5> Cycle where last failure detected for this command

<6> Verification error (Table 9-3)

QT.002 (See Figures A-8 and A-9)

<7> AST serial output data - number of words output plus 32 output data words

<8> AST serial input data - number of words received plus 32 input data words

<9> CAMAC Analog Output values displayed in hexadecimal - 12 bit Analog Outputs

<10> Commanded GYRO counts

<11> RIUI Data
serial data words received plus last data received

<12> NAF Command
N,A,F write/read data

QT.003 (See Figure A-10)

No real time data

QT.004 (See Figures A-11 and A-12)

<13> Octal Address of Data

<14> Hexadecimal data - 14 data words per line

QT.005 (See Figure A-13 and A-14)

<15> Serial Command (SEID to DEP)
32 Data Words

<16> Serial Response #1 (DEP to SEID)
Number of words received plus 32 data words

<17> Serial Response #2 (DEP to SEID)
Number of words received plus 32 data words

<18> RIU Data (2 channels)
Number of words received (2 channels)
First word = First word received
Fifteen word wrap around data buffer

<19> RIU Data (2 channels)
Number of words received (2 channels)
First word = first word received
Fifteen word wrap around data buffer

5.0 PDSS/IMC QT SEID MONITOR

The SEID monitor loop for the PDSS/IMC QT is contained in file "QT.MON". The monitor loop is defined as follows:

CYCLE	COMMANDS		CYCLE	COMMANDS	
1	/TIME	0		/PSAMPLE	42
2	/PSAMPLE	0		/PSAMPLE	44
	/PSAMPLE	2		/PSAMPLE	46
	/PSAMPLE	4		/PSAMPLE	48
	/PSAMPLE	6		/PSAMPLE	50
	/PSAMPLE	8		/PSAMPLE	52
	/PSAMPLE	10		/PSAMPLE	54
	/PSAMPLE	14		/PSAMPLE	56
	/PSAMPLE	16		/PSAMPLE	58
	/PSAMPLE	18		/PSAMPLE	60
	/PSAMPLE	20		/PSAMPLE	62
	/PSAMPLE	22	25	/TIME	
	/PSAMPLE	24		/READ	0
	/PSAMPLE	26	50	/TIME	
	/PSAMPLE	28		/READ	0
	/PSAMPLE	30	75	/TIME	
3	/PSAMPLE	32		/READ	0
	/PSAMPLE	34			
	/PSAMPLE	36			
	/PSAMPLE	38			
	/PSAMPLE	40			

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6.0 PDSS/IMC QT DATA

The QT test data is listed below. This data can be displayed on the VDU via the "=VIEW" command and can be modified by the "=MOD" command or by data parameters on the QT test commands.

DATA NAME	INDEX	DATA
DRDRI	0	0020
		FAF5 1111 2222 3333 4444 5555 6666 7777
		8888 9999 AAAA BBBB CCCC DDDD EEEE FFFF
		0000 0123 4567 89AB CDEF FEDC BA98 7654
		3210 0011 2233 4455 3210 0011 2233 4455
DRDIS	33	0000 0101 0200 0301 0400 0501 0600 0701
		0800 0901 0A00 0B01 0C00 0D01 0E00 0F01
		1000 1101 1200 1301 1400 1501 1600 1701
		1800 1901 1A00 1B01 1C00 1D01 1E00 1F01
DRALG	65	0000 0000 0000 0000 0000 0000 0000 0000
		0000 0000 0000 0000 0000 0000 0000 0000
		0000 0000 0000 0000 0000 0000 0000 0000
		0000 0000 0000 0000 0000 0000 0000 0000
DRGYR	97	0400 0800 0400 1000 0400 1800 0400 2000
		0400 2800 1400 3000 0400 0800 0400 1000
		0400 1800 0400 2000 0400 2800 0400 3000
DRDRS	121	0020
		0001 FFFE 0003 FFFC 0005 FFFA 0007 FFF8
		0009 FFF6 000B FFF4 000D FFF2 000F FFF0
		1111 2222 3333 4444 5555 6666 7777 8888
		9999 AAAA BBBB CCCC DDDD EEEE FFFF 0000

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DISON	154	FFFF FFFF 002A
DISOF	157	FFFF FFFF 0000
DISOT	160	0400 0800 0400 1000 0400 1800 0400 2000 0400 2800 1400 3000 0400 0800 0400 100 0400 1800 0400 2000 0400 2800 0400 3000
DIDWP	192	0032 0000 0101
DIDUI	195	0032 0000 0101 0000 0101
DIDRS	200	0020 0001 FFFE 0003 FFFC 0005 FFFA 0007 FFF8 0009 FFF6 000B FFF4 000D FFF2 000F FFF0 1111 2222 3333 4444 5555 6666 7777 8888 9999 AAAA BBBB CCCC 9999 AAAA BBBB CCCC

The SEID GML Data Buffer layout is listed below.

NAME	INDEX	DATA
GMT	0	5 WORDS
MET	5	4 WORDS
PCMO	9	Number and Status + 32 WORDS
FI		128 BYTES
DO		64 BYTES
SAI		32 BYTES
SDI		8 WORDS
SSI		32 WORDS

7.0 PDSS/IMC DATA INTERFACES

The following tables define the PDSS/IMC interfaces.

Table 7-1 specifies the PDSS CAMAC Analog Output assignments.

Table 7-2 specifies the PDSS/SEID Flexible Input assignments.

Table 7-3 specifies the PDSS/SEID Discrete Output assignments.

TABLE 7-1: PDSS CAMAC ANALOG OUTPUTS

CAMAC-NAF	CAMAC-AO	IMCE A/D	INTERFACE	
N9A0	00	AI 17	ASTROS	CCD TEMP
N9A1	01	AI 18	ASTROS	HEAT SINK TEMP
N9A2	02	AI 19	ASTROS	OPTICS TEMP
N9A3	03	AI 20	ASTROS	EA TEMP
N9A4	04	AI 21	ASTROS	CCD COOL PWR
N9A5	05	AI 22	ASTROS	HEAT #1 PWR
N9A6	06	AI 23	ASTROS	HEAT #2 PWR
N9A7	07	AI 24	ASTROS	HEAT #3 PWR
N10A0	08	AI 25	+5V	
N10A1	09	AI 26	+8V	
N10A2	10	AI 27	+18V	
N10A3	11	AI 28	-18V	
N10A4	12	AI 29	ASTROS	SA ELEC. TEMP
N10A5	13	AI 30	ASTROS	BASEPLACE TEMP
N10A6	14	AI 31	UIT	XERR
N10A7	15	AI 32	UIT	YERR
N11A0	16	AI 1	POWER	+5V
N11A1	17	AI 2	POWER	+15V
N11A2	18	AI 3	POWER	-15V
N11A3	19	AI 4	POWER	TEMP
N11A4	20	AI 5	DRIRU	T/MA
N11A5	21	AI 6	DRIRU	T/MB
N11A6	22	AI 7	DRIRU	T/MC
N11A7	23	AI 8		
N12A0	24	AI 9		
N12A1	25	AI 10		
N12A2	26	AI 11	DRIRU	ANRXA
N12A3	27	AI 12	DRIRU	ANRXB
N12A4	28	AI 13	DRIRU	ANRYB
N12A5	29	AI 14	DRIRU	ANRYC
N12A6	30	AI 15	DRIRU	ANRZA
N12A7	31	AI 16	DRIRU	ANRZC

TABLE 7-2: SEID FLEXIBLE INPUTS

SEID-FI	IMCE			INTERFACE
00	DIO	DO	1	T/E COOL PWR ON/OFF
01	DEI	DO		DRIRU RRH1A
02	DIO	DO	2	SPARE
03	DEI	DO		DRIRU RRH2A
04	DIO	DO	3	MASTER RESET
05	DEI	DO		DRIRU RRL1A
06				
07	DEI	DO		DRIRU RRLZA
08				
09	DEI	DO		DRIRU RRH1B
10				
11	DEI	DO		DRIRU RRH2B
12				
13	DEI	DO		DRIRU RRL1B
14				
15	DEI	DO		DRIRU RRL2B
16				
17	DEI	DO		DRIRU RRH1C
18				
19	DEI	DO		DRIRU RRH2C
20				
21	DEI	DO		DRIRU RRL1C
22				
23	DEI	DO		DRIRU RRL2C
24				
25				
26				
27				
28				
29				
30				

TABLE 7-2: SEID FLEXIBLE INPUTS
(CONTINUED)

SEID-FI	IMCE		INTERFACE
31			
32			
33	PWR	A0	+5V
34			
35	PWR	A0	+6V
36			
37	PWR	A0	+15V
38			
39	PWR	A0	-15V
40			
41	PWR	A0	+24V
42			
43	PWR	A0	-24V
44			
45	PWR	A0	PWR TEMP
46			
47	PWR	A0	PWR STATUS
48			
49	PWR	A0	-6V
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			

TABLE 7-3: SEID DISCRETE OUTPUTS

SEID-DO	IMCE		INTERFACE		
00	DIO	DI	ASTROS MASTER CLOCK STATUS		
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16	DIO	DI	101	DRIRU	RSTX1A
17	DIO	DI	103	DRIRU	RSTX1B
18	DIO	DI	105	DRIRU	RSTY1B
19	DIO	DI	107	DRIRU	RSTY1C
20	DIO	DI	109	DRIRU	RSTZ1A
21	DIO	DI	111	DRIRU	RSTZ1C
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

TABLE 7-3: SEID DISCRETE OUTPUTS
(CONTINUED)

SEID-DO	IMCE	INTERFACE
32	EA	HEATER ON
33	EA	HEATER OFF
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		DRIRU II X POWER ON
49		DRIRU II X POWER OFF
50		DRIRU II Y POWER ON
51		DRIRU II Y POWER OFF
52		DRIRU II Z POWER ON
53		DRIRU II Z POWER OFF
54		DRIRU II HEATER POWER ON
55		DRIRU II HEATER POWER OFF
56		IMCE POWER ON
57		IMCE POWER OFF
58		IMCE HEATER ON
59		IMCE HEATER OFF
60		AST POWER ON
61		AST POWER OFF
62		EA HEATER ON
63		EA HEATER OFF

8.0 QT MESSAGES

The following messages are displayed to the PDSS system console. An explanation of each message is given.

MSG#	MESSAGE
1	QT: INVALID PARAMETERS The QT command syntax is incorrect, a parameter value is invalid, or the number of parameters is incorrect.
2	QT: INVALID COMMAND The QT command is invalid and is not processed.
3	QT: ERROR MAPPING EXTENDED MEM The RT-11 system calls to establish Extended Memory Mapping indicates an error. This is an RT-11 or hardware error. PDSS/IMC will not run without Extended Memory Mapping.
4	QT: LOOPUP ERROR A system LOOKUP error for a data file was in error.
5	QT: READ ERROR Disk read error occurred.
6	QT: NO ACK (1) No acknowledge received from IMCE for first command.
8	QT: NO RESPONSE (1) First response message from IMCE not received within time limit.
9	QT: NO RESPONSE (2) Second response message from IMCE not received within time limit.

10 QT: WELCOME TO PDSS/IMC -- STRIKE "=STAR" TO PROCEED
Initialize Attention Message.

11 QT: QT INIT COMPLETE -- STRIKE "=STAR" TO PROCEED
IMC initialization has been completed.

12

13

14 QT: CANNOT OPEN IMC.LOG
The IMC log file (IMC.LOG) could not be opened.

15 QT: LOG FULL
The IMC log file (IMC.LOG) is full and has been closed.

16 QT: GYRO COMPLETE FAIL
The GYRO complete LAMS have not been received within the time limit.

17 QT: PMEM LP ERROR
An error was encountered in writing to the Line Printer. Verify that the printer is on.

18 QT: INVALID DEP ACK
The acknowledge serial message did not have a "1200" as the first word.

19 QT: INVALID DEP RESPONSE 1
The first response message from the DEP did not have a "1281" as the first word.

20 QT: INVALID DEP RESPONSE 2
The second response message from the DEP did not have a "1281" as the first word.

9.0 QT STATUS/ERROR CODES

The PDSS/IMC QT software provides a variety of error indicators.

Section 8.0 lists the messages that are sent to the PDSS system console.

The QT.001 display page (Figure A-6) displays several status/error words.

TABLE 9-1: VERRD DESCRIPTION

BIT	MEANING	SOURCE
0	DEP STATUS BIT "0" ON	TCMD
1	IMCE INSTRUCTION TEST FAIL	RVXIIT
2	IMCE MEMORY TEST FAIL	RVXIMT
3		RVRDIS
4	GYRO RATE ERROR	RVRGYR
5	RIU COUNTER/PATTERN FAILURE (WUPPE)	RVIDWP
6	RIU COUNTER/PATTERN FAILURE (UIT)	RVIDUI
7	GMT COMPARE FAIL	RVRGMT
8	RAUI-SI COMPARE FAIL	RVIDRS
9	DATA COMPARE ERROR	DV32
10	SPSR STATE FAIL	RVSPSR
11		
12		
13		
14		
15		

0 = LSB, 15 = MSB

TABLE 9-2: VERRI DESCRIPTION

BIT	MEANING
0	RIUI #1 DATA FAIL (FIRST)
1	RIUI #1 DATA FAIL (LAST)
2	RIUI #2 DATA FAIL (FIRST)
3	RIUI #2 DATA FAIL (LAST)
4	RIUI #3 DATA FAIL (FIRST)
5	RIUI #4 DATA FAIL (LAST)
6	RIUI #4 DATA FAIL (FIRST)
7	RIUI #4 DATA FAIL (LAST)
8	WATCH DOG TIME OUT ACK OF COMMAND
9	WATCH DOG TIME OUT ON RESPONSE #1
10	WATCH DOG TIME OUT ON RESPONSE #2
11	INVALID RESPONSE #1 ('1281') HEADER
12	INVALID RESPONSE #2 ('1281') HEADER
13	
14	
15	INVALID ACKNOWLEDGE ('1200')

0 = LSB, 15 = MSB

TABLE 9-3: VERIFICATION INDEX

INDEX	PDSS/DATA	IMCE/DATA
01 C(15)	A0-00 CA0	AI-17 IMCAI
02 C(14)	A0-01	AI-18
03 C(13)	A0-02	AI-19
04 C(12)	A0-03	AI-20
05 C(11)	A0-04	AI-21
06 C(10)	A0-05	AI-22
07 C(09)	A0-06	AI-23
08 C(08)	A0-07	AI-24
09 C(07)	A0-08	AI-25
0A C(06)	A0-09	AI-26
0B C(05)	A0-10	AI-27
0C C(04)	A0-11	AI-28
0D C(03)	A0-12	AI-29
0E C(02)	A0-13	AI-30
0F C(01)	A0-14	AI-31
10 C(00)	A0-15	AI-32
11 D(15)	A0-16	AI-01
12 D(14)	A0-17	AI-02
13 D(13)	A0-18	AI-03
14 D(12)	A0-19	AI-04
15 D(11)	A0-20	AI-05
16 D(10)	A0-21	AI-06
17 D(09)	A0-22	AI-07
18 D(08)	A0-23	AI-08
19 D(07)	A0-24	AI-09
1A D(06)	A0-25	AI-10
1B D(05)	A0-26	AI-11

TABLE 9-3: VERIFICATION INDEX
(CONTINUED)

INDEX	PDSS/DATA	IMCE/DATA
1C D(04)	AO-27	AI-12
1D D(03)	AO-28	AI-13
1E D(02)	AO-29	AI-14
1F D(01)	AO-30	AI-15
20 D(00)	AO-31	AI-16
21 E(15)	FI-00 FI	DO-01 IDO
22 E(14)	FI-01	
23 E(13)	FI-02	DO-02
24 E(12)	FI-03	DO-33
25 E(11)	FI-04	
26 E(10)	FI-05	
27 E(09)	FI-06	
28 E(08)	FI-07	DO-33
29 E(07)	FI-08	
2A E(06)	FI-09	
2B E(05)	FI-10	
2C E(04)	FI-11	DO-35
2D E(03)	FI-12	
2E E(02)	FI-13	
2F E(01)	FI-14	
30 E(00)	FI-15	DO-35
31 F(15)	FI-16	
32 F(14)	FI-17	
33 F(13)	FI-18	
34 F(12)	FI-19	DO-37
35 F(11)	FI-20	
36 F(10)	FI-21	

TABLE 9-3: VERIFICATION INDEX
(CONTINUED)

INDEX	PDSS/DATA	IMCE/DATA
37 F(09)	FI-22	
38 F(08)	FI-23	DO-37
39 F(07)	FI-24	
3A F(06)	FI-25	
3B F(05)	FI-26	
3C F(04)	FI-27	
3D F(03)	FI-28	
3E F(02)	FI-29	
3F F(01)	FI-30	
40 F(00)	FI-31	
41 G(15)	FI-32	
42 G(14)	FI-33	
43 G(13)	FI-34	
44 G(12)	FI-35	
45 G(11)	FI-36	
46 G(10)	FI-37	
47 G(09)	FI-38	
48 G(08)	FI-39	
49 G(07)	FI-40	
4A G(06)	FI-41	
4B G(05)	FI-42	
4C G(04)	FI-43	
4D G(03)	FI-44	
4E G(02)	FI-45	
4F G(01)	FI-46	
50 G(00)	FI-47	
51 H(15)	FI-48	

TABLE 9-3: VERIFICATION INDEX
(CONTINUED)

INDEX	PDSS/DATA	IMCE/DATA
52 H(14)	FI-49	
53 H(13)	FI-50	
54 H(12)	FI-51	
55 H(11)	FI-52	
56 H(10)	FI-53	
57 H(09)	FI-54	
58 H(08)	FI-55	
59 H(07)	FI-56	
5A H(06)	FI-57	
5B H(05)	FI-58	
5C H(04)	FI-59	
5D H(03)	FI-60	
5E H(02)	FI-61	
5F H(01)	FI-62	
60 H(00)	FI-63	
61 I(15)	DO-00 SDOS	DI-1 IDI
62 I(14)	DO-01	DI-2
63 I(13)	DO-02	DI-3
64 I(12)	DO-03	DI-4
65 I(11)	DO-04	DI-5
66 I(10)	DO-05	DI-6
67 I(09)	DO-06	DI-7
68 I(08)	DO-07	DI-8
69 I(07)	DO-08	DI-9
6A I(06)	DO-09	DI-10
6B I(05)	DO-10	DI-11
6C I(04)	DO-11	DI-12
6D I(03)	DO-12	DI-13

TABLE 9-3: VERIFICATION INDEX
(CONTINUED)

INDEX	PDSS/DATA	IMCE/DATA
6E I(02)	DO-13	DI-14
6F I(01)	DO-14	DI-15
70 I(00)	DO-15	DI-16
71 J(15)	DO-16	DI-17
72 J(14)	DO-17	DI-18
73 J(13)	DO-18	DI-19
74 J(12)	DO-19	DI-20
75 J(11)	DO-20	
76 J(10)	DO-21	
77 J(09)	DO-22	
78 J(08)	DO-23	
79 J(07)	DO-24	
7A J(06)	DO-25	
7B J(05)	DO-26	
7C J(04)	DO-27	
7D J(03)	DO-28	
7E J(02)	DO-29	
7F J(01)	DO-30	
80 J(00)	DO-31	
81 K(15)	DO-32	DI-32
82 K(14)	DO-33	pw
83 K(13)	DO-34	pw
84 K(12)	DO-35	
85 K(11)	DO-36	
86 K(10)	DO-37	
87 K(09)	DO-38	
88 K(08)	DO-39	

TABLE 9-3: VERIFICATION INDEX
(CONTINUED)

INDEX	PDSS/DATA	IMCE/DATA
89 K(07)	D0-40	
8A K(06)	D0-41	
8B K(05)	D0-42	
8C K(04)	D0-43	
8D K(03)	D0-44	
8E K(02)	D0-45	
8F K(01)	D0-46	
90 K(00)	D0-47	
91 L(15)	D0-48	
92 L(14)	D0-49	pw
93 L(13)	D0-50	pw
94 L(12)	D0-51	pw
95 L(11)	D0-52	pw
96 L(10)	D0-53	pw
97 L(09)	D0-54	pw
98 L(08)	D0-55	pw
99 L(07)	D0-56	pw
9A L(06)	D0-57	pw
9B L(05)	D0-58	pw
9C L(04)	D0-59	pw
9D L(03)	D0-60	pw
9E L(02)	D0-61	pw
9F L(01)	D0-62	pw
A0 L(00)	D0-63	pw

TABLE 9-4: GYROF/GYROE/GYROA DEFINITION

BIT	INTERRUPT (LAM)
0	
1	
2	GYRO Channel #1 Second Output
3	GYRO Channel #2 Second Output
4	GYRO Channel #3 Second Output
5	GYRO Channel #4 Second Output
6	GYRO Channel #5 Second Output
7	GYRO Channel #6 Second Output
8	
9	
10	GYRO Channel #1 First Output
11	GYRO Channel #2 First Output
12	GYRO Channel #3 First Output
13	GYRO Channel #4 First Output
14	GYRO Channel #5 First Output
15	GYRO Channel #6 First Output

10.0 PDSS/IMC QT GENERATION

The PDSS/IMC files are as follows.

FILE	CONTENTS
IMCQT.MAC	QT Source Code
IMCQT.OBJ	QT Object Code
QT.MON	QT SEID Monitor File
QT.001	QT Display Page 1 Background
QT.002	QT Display Page 2 Background
QT.003	QT Display Page 3 Background
QT.004	QT Display Page 4 Background
QT.005	QT Display Page 5 Background
IMC.LOG	IMCLOG

Following is the RT-11 command to recompile the QT software.

```
MACRO IMCQT
```

Following is the RT-11 command to link the QT software.

```
@LQT
```

The contents of the LQT.COM file is as follows.

```
R  LINK
PDSSQT, PDSS=PDSS, READKB, USRKB, LOG, INTHEX/C
VRAMC, SEID2, USRDP, USRSQ, USRQT, IMCQT//
CONTRL-C
```

Following is the RT-11 command to run the QT software.

```
@RQT
```

The contents of the RQT.COM file is as follows.

```
FRUN  PDSSFG.SAV
RUN PDSSQT
```

11.0 QT LOG BUFFER FORMAT

The QT LOG buffer format is defined in Table 11-1.

The QT LOG buffer size is 852 words or four blocks (1 block = 256 words).

The QT LOG writes data to file IMC.LOG.

The RT-11 utility "RDUMP" may be used to dump the log file.

Example:

```
R RDUMP
TT: = IMC.LOG
```

Displays the log on the system terminal terminal

TABLE 11-1: LOG FORMAT

```
.TITLE  PDSS/IMC QT DATA BUFFERS
;-------------------------------------------------;  COMMON BLOCK DEFINITIONS
        .PSECT  RSPBUF,RW,D,GBL,REL,OVR          ;
GMT:            .BLKW   5                   0;  GMT
MET:            .BLKW   5                   5;  MET
PCMD:           .BLKW   33.*4              10;  PCM
FI:             .BLKB   120.               142;  FI
DO:             .BLKB   64.                206;  DO
;-------------------------------------------------;
;  QT LOCAL DATA                                ;
;-------------------------------------------------;
                .EVEN                        ;
ABEGIN:         .WORD   ABEGIN+2           238;  A(ZAP) BEGIN
CLLOG:          .BLKW   8.                 239;  LOG COMMENT LINE
IMCGMT:         .BLKW   6                  247;  IMC GMT
TID:            .BLKW   1                  253;  ACTIVE TEST
CYCLE:          .BLKW   1                  254;
                .BLKW   1                  255;
VERRD:          .BLKW   1                  256;  DATA VERIFY
VERRI:          .BLKW   1                  257;  / VERIFY ERRORS
ZCSR:           .BLKW   1                  258;  COPY OF CSR
LOGBLK:         .BLKW   1                  259;  LOG BLOCK NO.
GYROF:          .BLKW   1                  260;  GYRO COMPLETE FLAG
GYROE:          .BLKW   1                  261;
GYROA:          .BLKW   1                  262;
SWAIT:          .BLKW   1                  263;  SPECIAL WAIT
DSPSR:          .BLKW   1                  264;  SPSR ACTIVE FLAG
DXHRM:          .BLKW   1                  265;  XHRM ACTIVE FLAG
ZSC:            .BLKW   1                  266;  STATUS CODE
DGMT:           .BLKW   3                  267;  GMT PRESET
ASEQ:           .BLKB   1                  270;  SEQ IND
```

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(CONTINUED)

```
SNGSEQ:         .BLKB   1                       ;  SINGLE=0/SEQUENCE<>0
XLOG:           .BLKB   1                   271;  LOG<>0 / NOLOG=0
MODE:           .BLKB   1                       ;  SST=SINGLE STEP=0 /
                                                ;    PSE=PROGRAM<>0
STEP:           .BLKB   1                   272;  CMD=COMMAND=1
                                                ;    ACK=ACKNOWLEDGE=2
                                                ;    RSP=RESPOND=3
                                                ;    ACK=ACKNOWLDEGE=4
                                                ;    END=END=5
XSTOP:          .BLKB   1                       ;  SYSTEM STOP INDICATOR
XVERF:          .BLKB   1                   273;  SYSTEM VERIFY INDICATOR
XRESET:         .BLKB   1                       ;  SYSTEM RESET INDICATOR
DISPGO:         .BLKB   1                   274;  DISP COMMAND SPEC. GO
MODF:           .BLKB   1                       ;  MCD ACTIVE FLAG
NOGYRO:         .BLKB   1                   275;  NO GYRO OUTPUT ON COMMAND
TPT:            .BLKB   1                       ;  THROUGHPUT TEST
DCHNG:          .BLKB   1                   276;  DATA CHANGE FLAG
DOGMT:          .BLKB   1                       ;  WRITE GMT ACTIVATIOR
WHOA:           .BLKB   1                   277;  STOP ON ERROR
                .BLKB   1                       ;
                                                ;
FSTACK:         .BLKW   16.                 278;  FAILURE STACK
                                                ;    COUNT(WORD)
                                                ;    VMAP ENTRY(BYTE)
PAGEX:          .BLKW   1                   294;  DISP PAGE IX FOR UPDATE
CMDMSG:         .BLKW   32.                 295;  COMMAND MESSAGE
RMSG1:          .BLKW   33.                 327;  RESPONSE MESSAGE 1
RMSG2:          .BLKW   33.                 360;  RESPONSE MESSAGE 2
RAUISO:         .BLKW   33.                 393;  RAUI SO
RAUISI:         .BLKW   33.                 426;  RAUI SI
CAO:            .BLKW   32.                 459;  CAMAC IO
IMCAI:          .BLKW   32.                 491;  IMC AI'S
IDO:            .BLKB   48.                 523;  DO SETTING
                                                ;    32 DIO DO
                                                ;    16 DEI DO
SDOS:           .BLKB   64.                 547;  SEID DO
IDI:            .BLKB   32.                 579;  IMCE DIO DI'S
GYROCX:         .BLKW   12.                 595;
                                                :
```

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TABLE 11-1: LOG FORMAT
(CONTINUED)

```
                                                    ;
GYROC1:         .BLKW   2                   607     ;   GYRO COUNTERS
GYROC2:         .BLKW   2                   609     ;
GYROC3:         .BLKW   2                   611     ;
GYROC4:         .BLKW   2                   613     ;
GYROC5:         .BLKW   2                   615     ;
GYROC6:         .BLKW   2                   617     ;
                                                    ;
RIUIC1:         .BLKW   1                   619     ;   RIUI COUNTERS
RIUIC2:         .BLKW   1                   620     ;
RIUIC3:         .BLKW   1                   621     ;
RIUIC4:         .BLKW   1                   622     ;
RIUIP1:         .BLKW   1                   623     ;   RIUI POINTERS
RIUIP2:         .BLKW   1                   624     ;
RIUIP3:         .BLKW   1                   625     ;
RIUIP4:         .BLKW   1                   626     ;
RIUIX1:         .BLKW   1                   627     ;   RIUI LAST DATA
RIUIX2:         .BLKW   1                   628     ;
RIUIX3:         .BLKW   1                   629     ;
RIUIX4:         .BLKW   1                   630     ;
RIUID1:         .BLKW   NRIUI               631     ;   RIUI DATA
RIUID2:         .BLKW   NRIUI               632     ;
RIUID3:         .BLKW   NRIUI               633     ;
RIUID4:         .BLKW   NRIUI               634     ;
                                                    ;
SEIDDO:         .BLKW   4                   695     ;   SEID DO'S
ZZ1:            .BLKW   1                   699     ;!!
ZZ2:            .BLKW   1                   700     ;!!
ZZ3:            .BLKW   1                   701     ;!!
ZZ4:            .BLKW   1                   702     ;!!
ZZ5:            .BLKW   12.                 703     ;!!
ZZ16:           .BLKW   16.                 715     ;
INBUFF:         .BLKW   92.                 731     ;   KEYBOARD INPUT BUFFER
ISONVD:         .BLKW   1                   821     ;   ISCN VARIABLE DATA
AEND:           .WORD   AEND                822     ;   A(ZAP) END
                                                    ;
```

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APPENDIX A

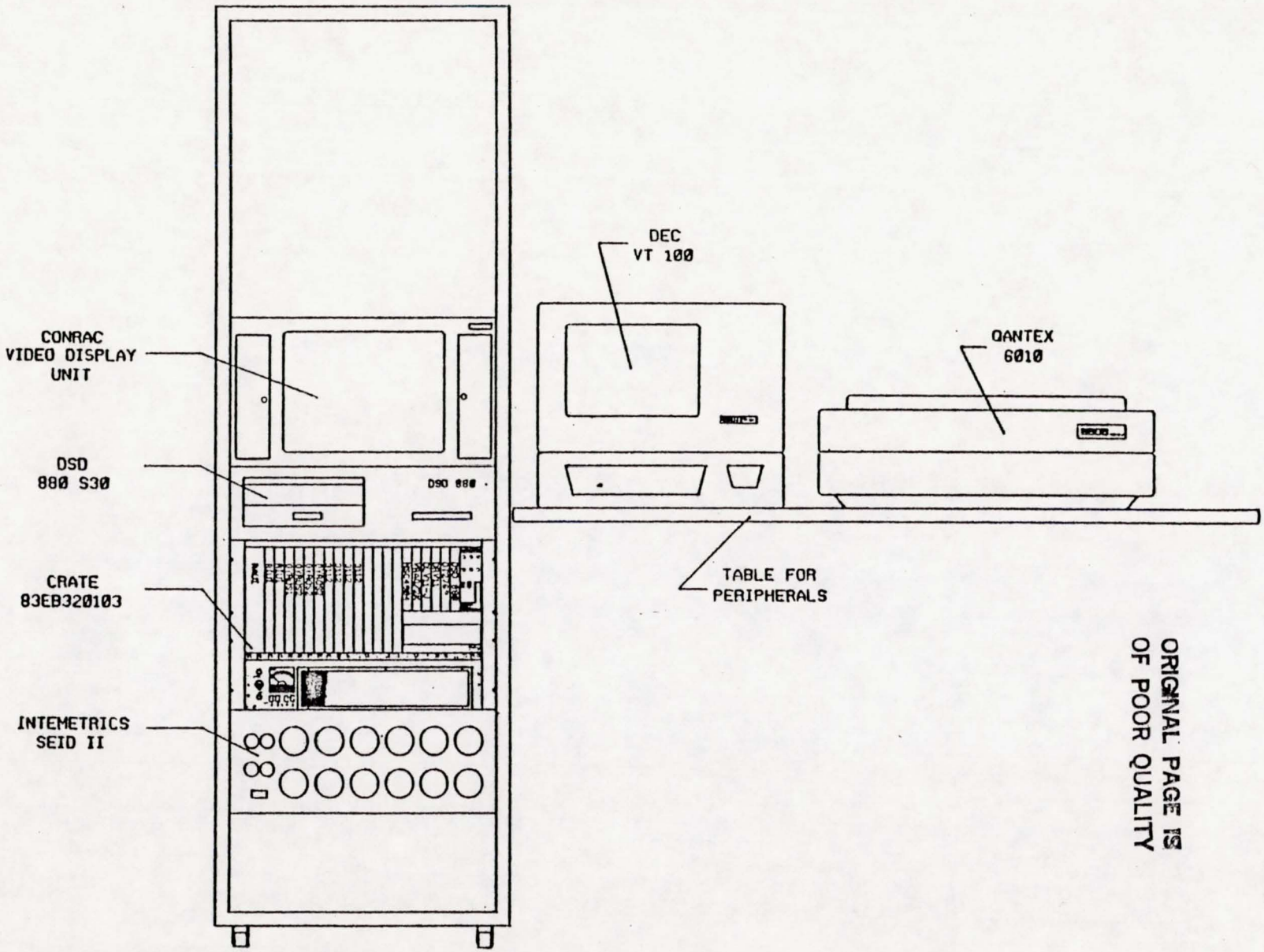

FIGURE A-1: PDSS/IMC GSE LAYOUT

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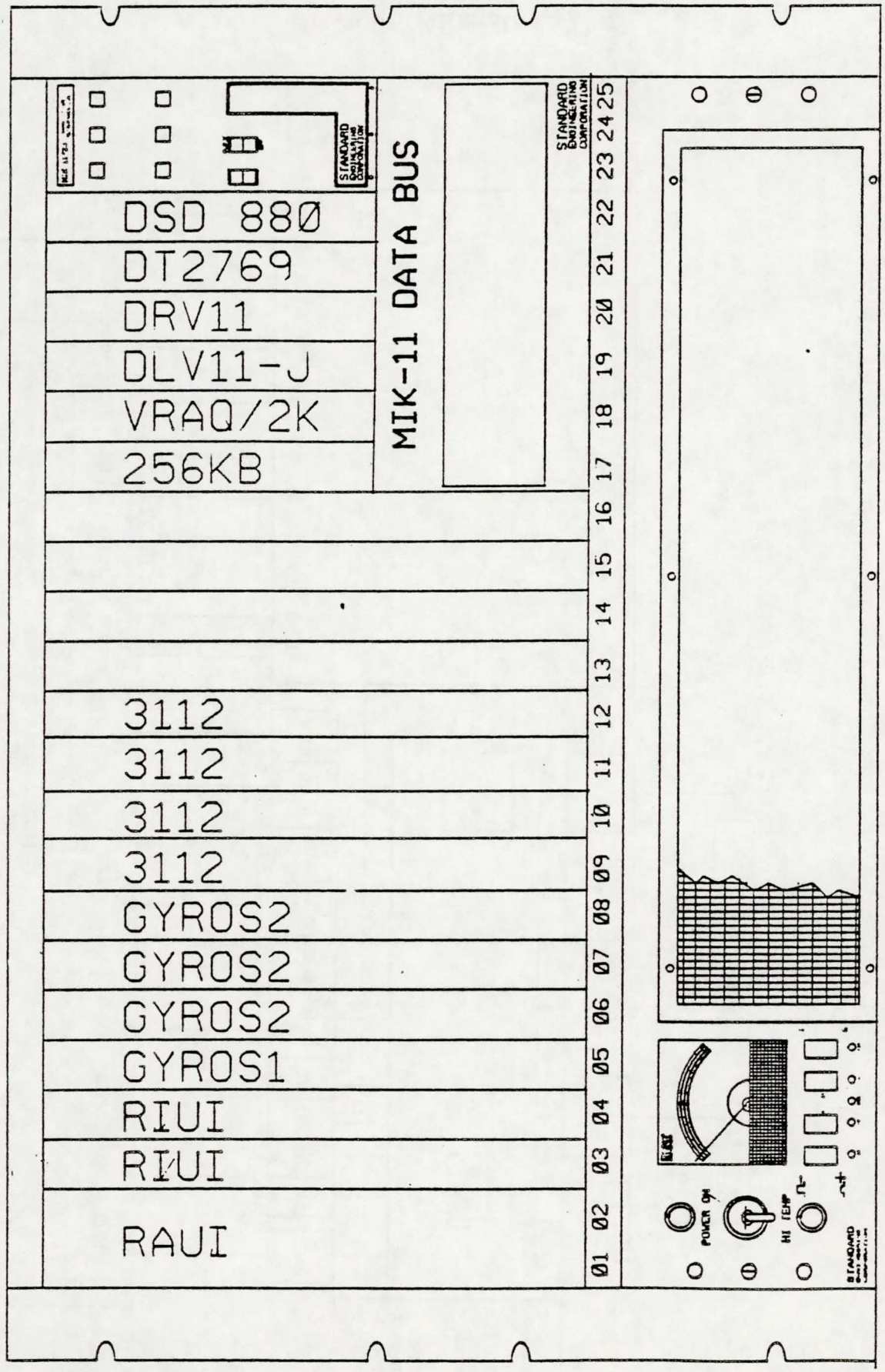

FIGURE A-2: PDSS/IMC CAMAC CRATE

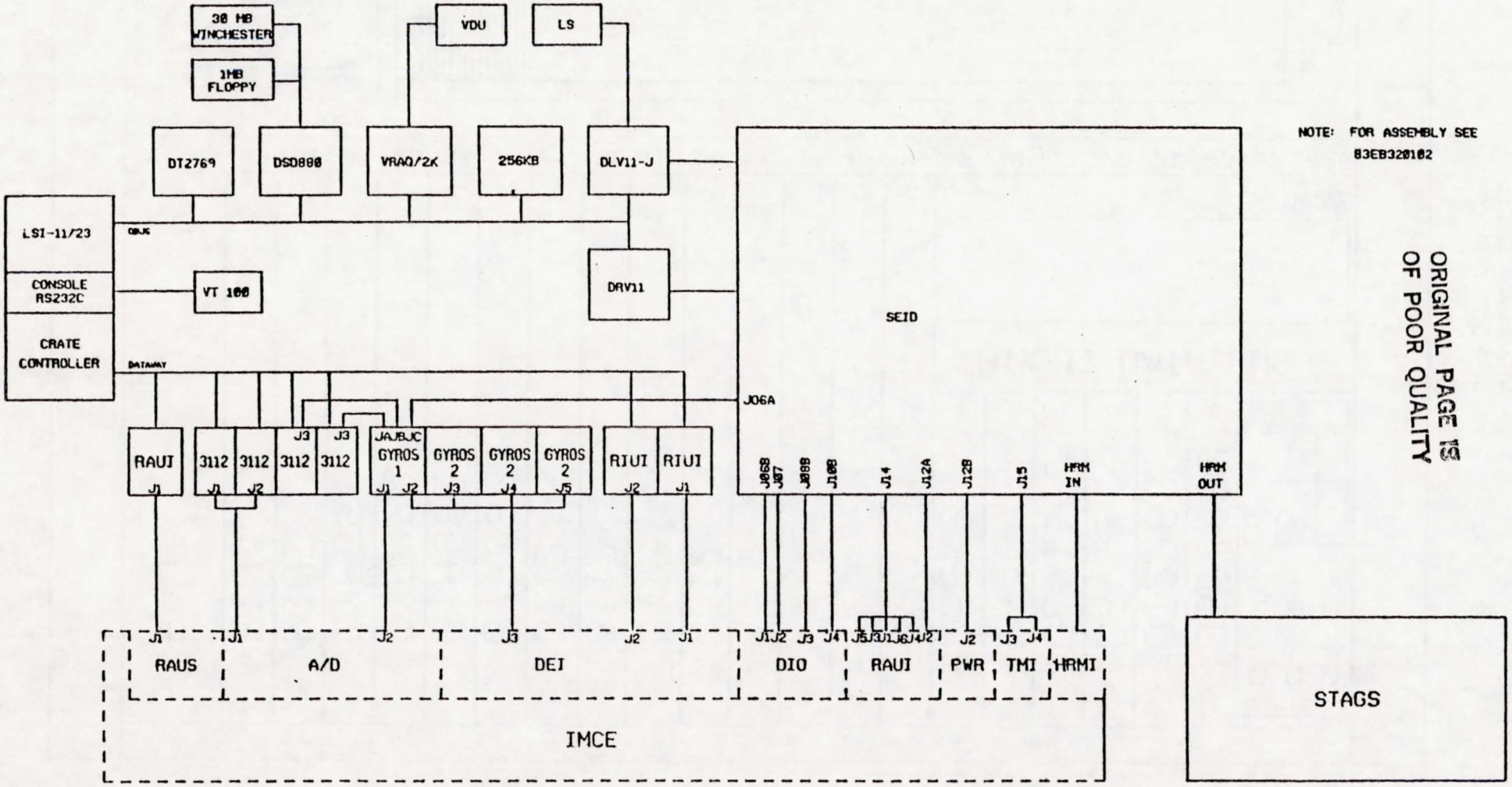

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FIGURE A-3: PDSS/IMC GSE DIAGRAM

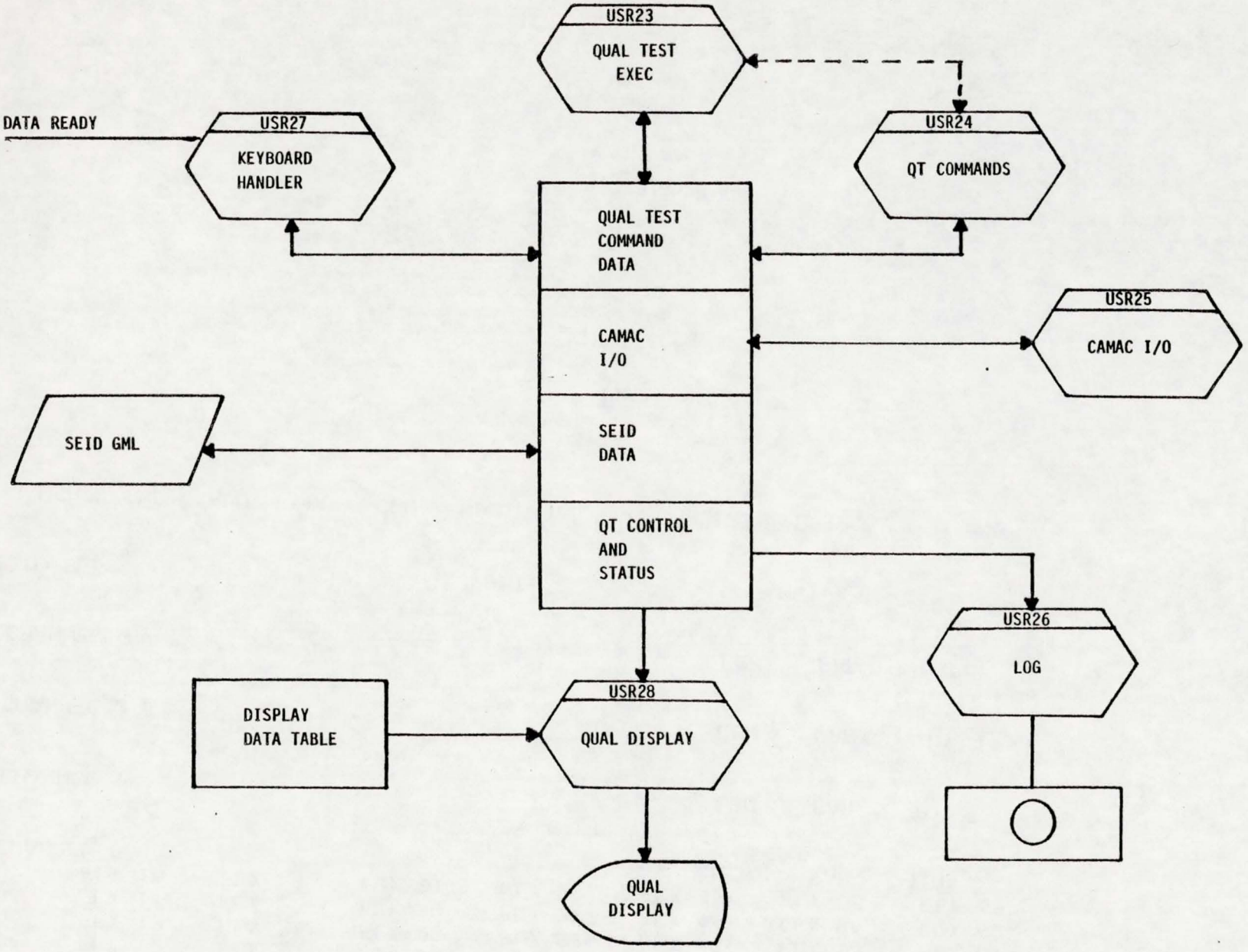

FIGURE A-4

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FLX 00	FLX 08	FLX 16	FLX 24	FLX 32	FLX 40	FLX 48	FLX 56
FLX 01	FLX 09	FLX 17	FLX 25	FLX 33	FLX 41	FLX 49	FLX 57
FLX 02	FLX 10	FLX 18	FLX 26	FLX 34	FLX 42	FLX 50	FLX 58
FLX 03	FLX 11	FLX 19	FLX 27	FLX 35	FLX 43	FLX 51	FLX 59
FLX 04	FLX 12	FLX 20	FLX 28	FLX 36	FLX 44	FLX 52	FLX 60
FLX 05	FLX 13	FLX 21	FLX 29	FLX 37	FLX 45	FLX 53	FLX 61
FLX 06	FLX 14	FLX 22	FLX 30	FLX 38	FLX 46	FLX 54	FLX 62
FLX 07	FLX 15	FLX 23	FLX 31	FLX 39	FLX 47	FLX 55	FLX 63

PCM CHANNEL 0 LEN PAR TOT

PCM CHANNEL 1 LEN PAR TOT

PCM CHANNEL 2 LEN PAR TOT

PCM CHANNEL 3 LEN PAR TOT

PDSS TO DEP GMT: MET:

LNK	USR	CMD	ADU	DDU	CDU	WDU	TME	GNC	IPS	REI	DSO	DMG

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FIGURE A-5

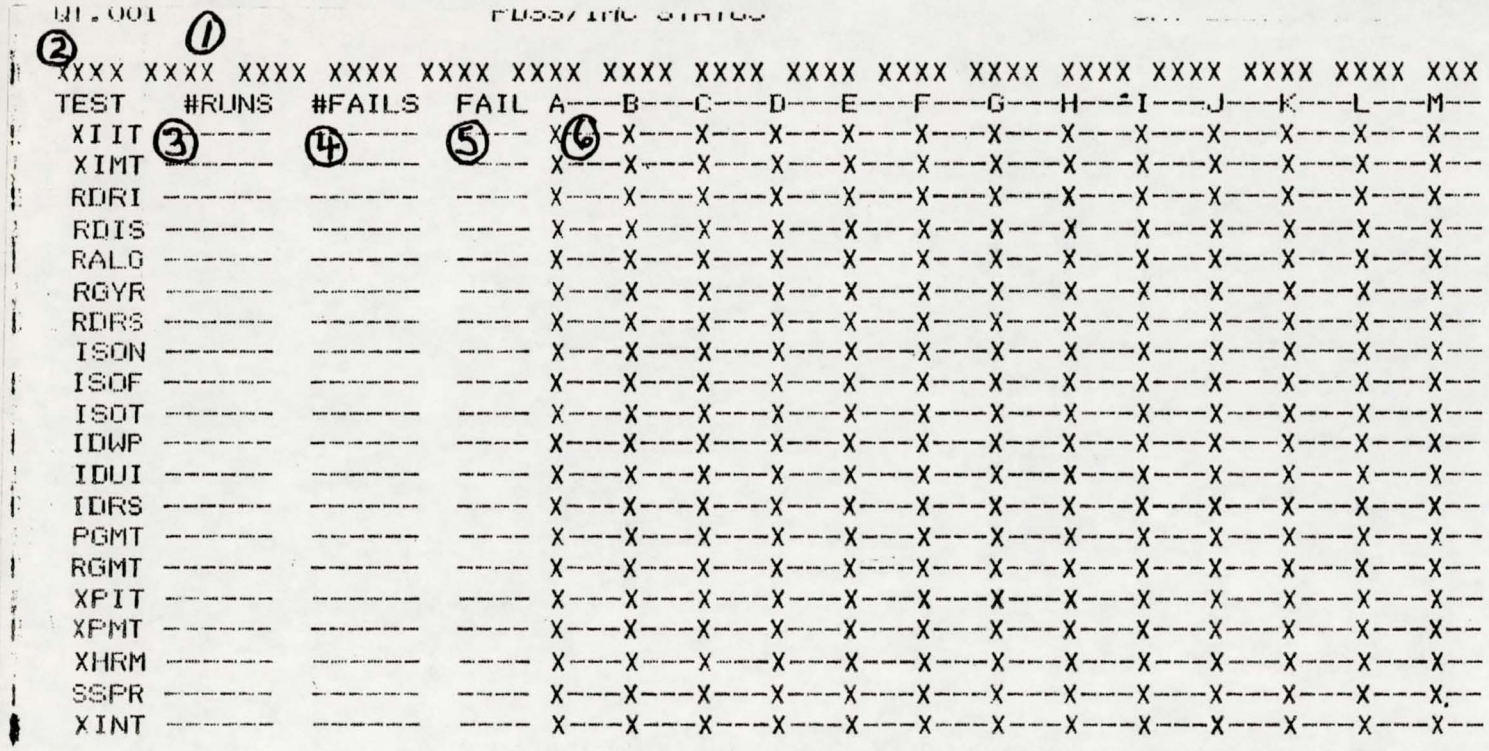

FIGURE A-6

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```
01C4 0000 0200 0000 F5C0 0000 0000 3F3F 003F 0000 0001 0000 8000 0001 0000 0000
TEST    #RUNS   #FAILS   FAIL A---B---C---D---E---F---G---H---I---J---K---L---M--
 XIIT       0        0   0000 00000000000000000000000000000000000000000000000000
 XIMT       0        0   0000 00000000000000000000000000000000000000000000000000
 RDRI       0        0   0000 00000000000000000000000000000000000000000000000000
 RDIS       0        0   0000 00000000000000000000000000000000000000000000000000
 RALG       7        0   0000 00000000000000000000000000000000000000000000000000
 RGYR      18        1   0089 0000000000001C0000000000000000000000000000000000
 RDRS       6        6   014D 02000000000000000000000000000000000000000000000000
 ISON       4        0   0000 00000000000000000000000000000000000000000000000000
 ISOF       4        0   0000 00000000000000000000000000000000000000000000000000
 ISOT       1        0   0000 00000000000000000000000000000000000000000000000000
 IDWP       0        0   0000 00000000000000000000000000000000000000000000000000
 IDUI       0        0   0000 00000000000000000000000000000000000000000000000000
 IDRS       0        0   0000 00000000000000000000000000000000000000000000000000
 PGMT       1        0   0000 00000000000000000000000000000000000000000000000000
 RGMT       0        0   0000 00000000000000000000000000000000000000000000000000
 XPIT       0        0   0000 00000000000000000000000000000000000000000000000000
 XPMT       0        0   0000 00000000000000000000000000000000000000000000000000
 XHRM       0        0   0000 00000000000000000000000000000000000000000000000000
 SSPR       1        0   0000 00000000000000000000000000000000000000000000000000
 XINT       0        0   0000 00000000000000000000000000000000000000000000000000
```

FIGURE A-7

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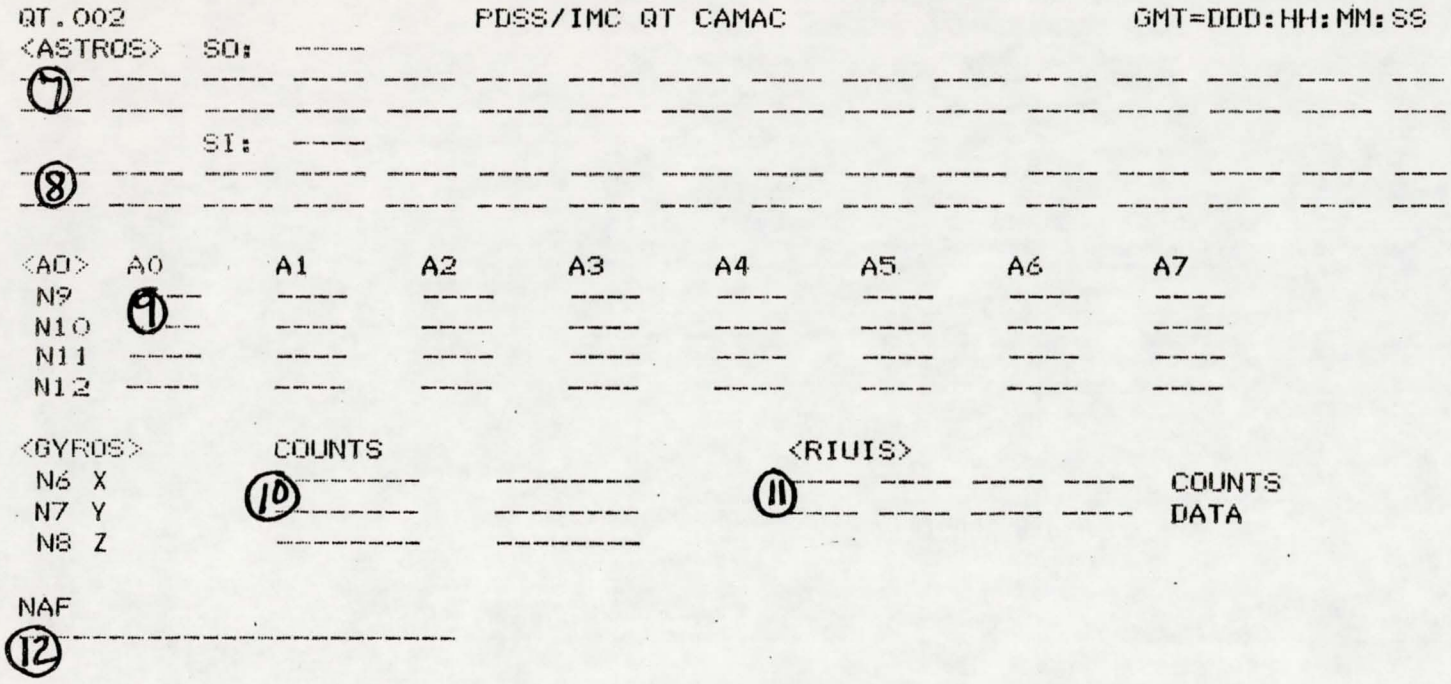

FIGURE A-8

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```
QT.002                          PDSS/IMC QT CAMAC                          GMT=
<ASTROS>  SO:  0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
          SI:  0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

<A0>  A0      A1      A2      A3      A4      A5      A6      A7
 N9   0000    0000    0000    0000    0000    0000    0000    0000
 N10  0000    0000    0000    0000    0000    0000    0000    0000
 N11  0000    0000    0000    0000    0000    0000    0000    0000
 N12  0000    0000    0000    0000    0000    0000    0000    0000

<GYROS>          COUNTS                          <RIUIS>
 N6 X            00000000    00000000            0000 0000 0000 0000  COUNTS
 N7 Y            00000000    00000000            0000 0000 0000 0000  DATA
 N8 Z            00000000    00000000

NAF
```

FIGURE A-9

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QT.003 GMT=DDD:HH:MM:SS

PDSS/IMC COMMANDS

XIIT	EXECUTE IMCE INSTRUCTION TEST
XIMT	EXECUTE IMCE MEMORY TEST
XPMT	EXECUTE PCC MEMORY TEST
XPIT	EXECUTE PCC INSTRUCTION TEST
XHRM	EXECUTE HRM OUTPUT FLIP/FLOP
XINT	EXECUTE IMCE INITIALIZE
XTPT	EXECUTE THROUGHPUT TEST
SSPR	SET PULSE SYNCHRONOUS READ
RGMT	READ GMT
PGMT	SET GMT

RDRI	READ RAUI DATA
RDIS	READ DISCRETES
RALG	READ ANALOGS
RGYR	READ GYROS
RDRS	READ RAUS DATA
ISON	ISSUE DISCRETE ON
ISOF	ISSUE DISCRETE OFF
ISOT	ISSUE DISCRETE OUT
IDWP	ISSUE WUPPE DATA
IDUI	ISSUE UIT DATA
IDRS	ISSUE RAUS DATA

CTRL	SYSTEM CONTROL
VIEW	VIEW MEMORY
MOD	MODIFY MEMORY
PMEM	PRINT MEMORY
LOG	LOG ON/OFF
DISP	DISPLAY SELECT

P	SINGLE STEP
STOP	STOP
SRST	SYSTEM RESET
STAR	START
COMM	COMMENT LOG
PIO	PERFORM IO

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FIGURE A-10

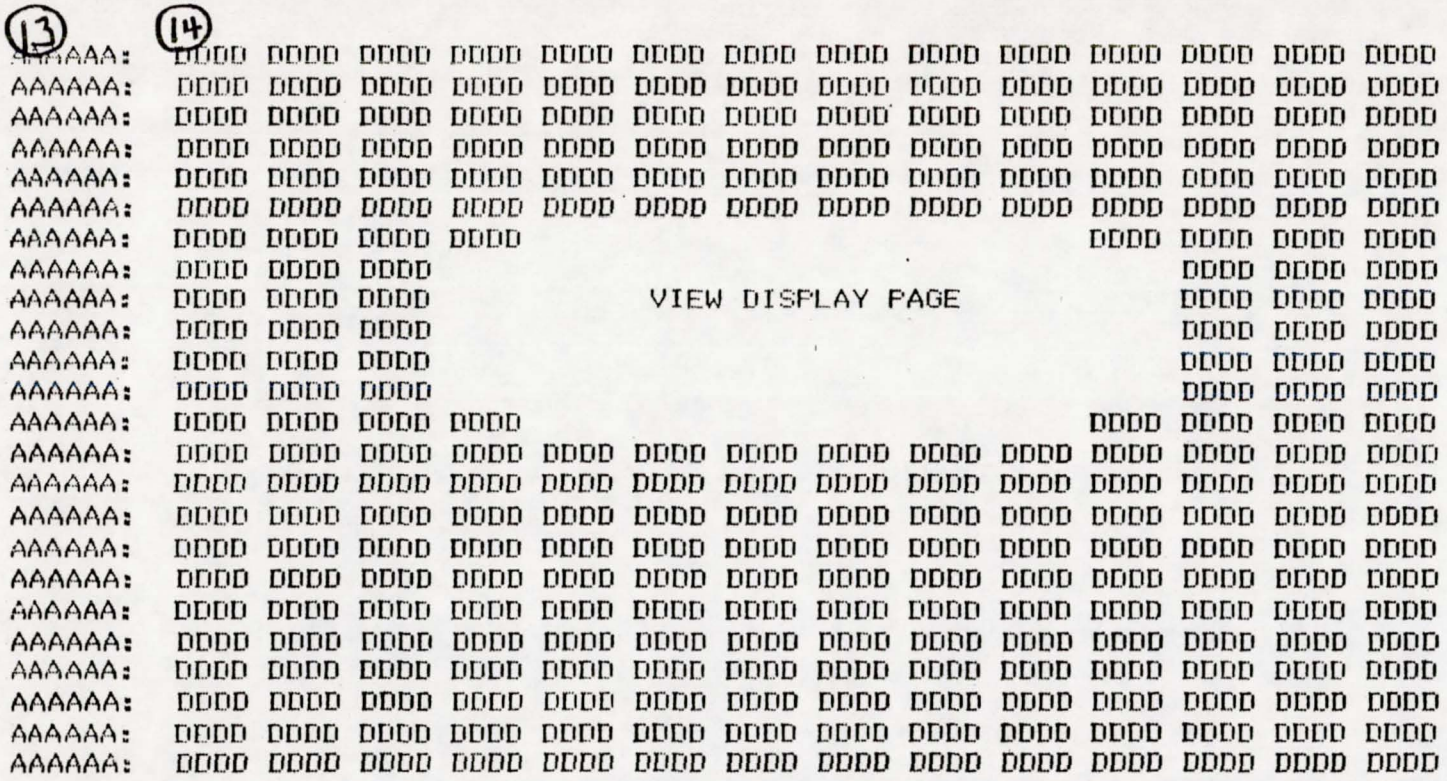

FIGURE A-11

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```
47770: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50024: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50060: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50114: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50150: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50204: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50240: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50274: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50330: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50364: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50420: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50454: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50510: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50544: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50600: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50634: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50670: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
50724: 51D6 0000 0000 0000 0000 0000 0000 0000 0000 2020 2020 2020 2020 2020
50760: 2020 0000 000E 0000 0000 0000 F5C0 0000 0000 0000 0000 0000 0000 0000
51014: 0000 0001 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
51050: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
51104: 0002 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
51140: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
51174: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

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FIGURE A-12

QT.005 PDSS/IMC QT MESSAGES GMT=DDD:HH:MM:SS

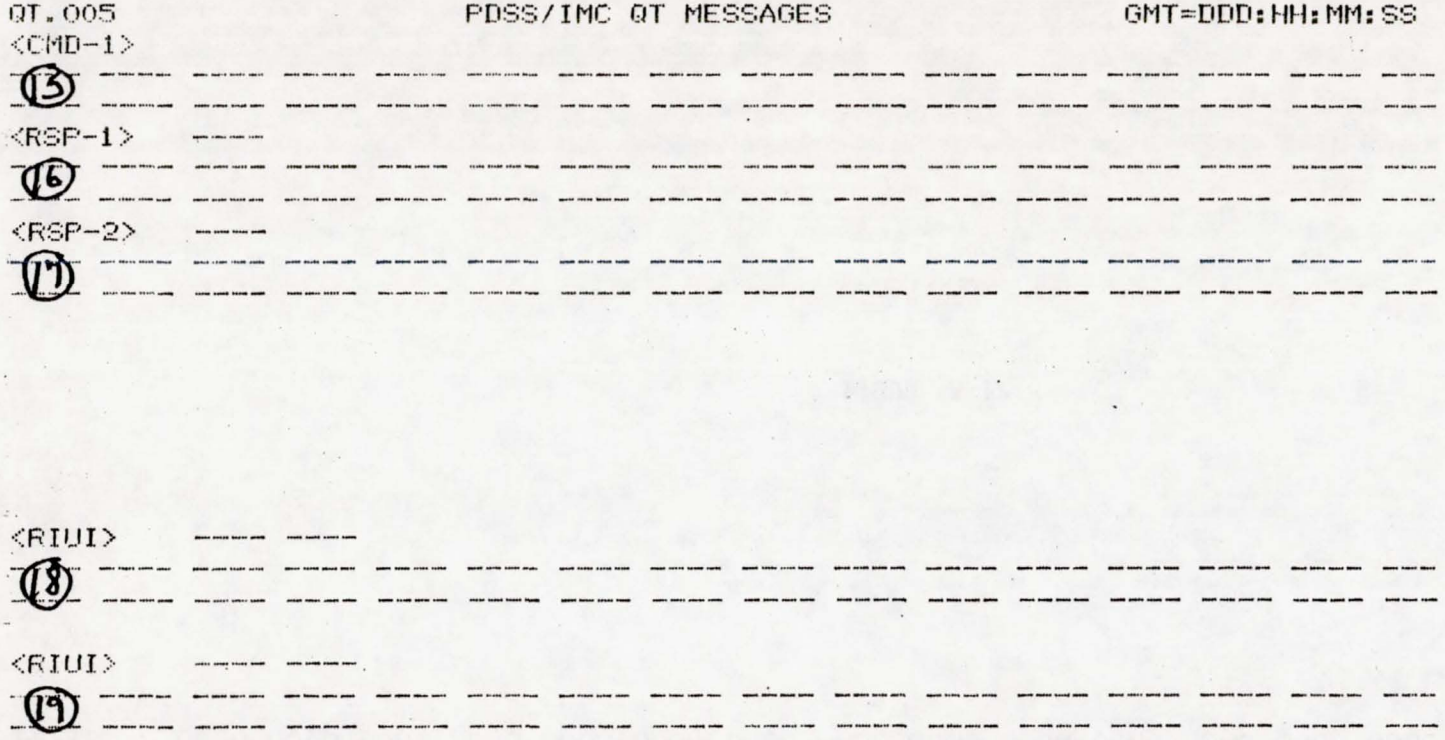

FIGURE A-13

ORIGINAL PAGE IS
OF POOR QUALITY

```
QT.005                          PDSS/IMC QT MESSAGES                    GMT=
<CMD-1>
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
<RSP-1>    0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
<RSP-2>    0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000



<RIUI>     0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

<RIUI>     0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

FIGURE A-14

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OF POOR QUALITY

PDSS MASTER

OPTION	
1	PDSS PREPARE
2	PDSS EXECUTE
3	PDSS POST-PROCESSING
4	MENU ON/OFF

SELECT OPTION:

FIGURE A-15

END

DATE

JUL. 25, 1984